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VERSION WITH MARKINGS TO SHOW CHANGES MADE

1. (Once Amended) A planarization method of inter-layer dielectrics, comprising the steps of:

providing a semiconductor substrate already completing a [the] basic process of forming devices such as a field oxide, a source, a drain, and a gate thereon;

forming a dielectric layer used as an inter-layer dielectric on said semiconductor substrate, lapping said dielectric layer by means of a [the] chemical mechanical polishing; and

forming a cap layer of a [high] refractive index larger than 1.6 on said lapped dielectric layer.

6. (Once Amended) The planarization method of inter-layer dielectrics as claimed in claim 1, wherein said cap layer is a silicon nitrogen-oxide layer capable of being transmitted by ultra-violet light.

9. (Once Amended) A planarization method of inter-metal dielectrics, comprising the steps of:

providing a semiconductor substrate having a plurality of metal-interconnects formed thereon;

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forming a dielectric layer used as an inter-metal dielectric on said substrate, lapping said dielectric layer by means of a [the] chemical mechanical polishing; and forming a cap layer of a [high] refractive index larger than 1.6 on said lapped dielectric layer.

17. (Once Amended) The planarization method of inter-metal dielectrics as claimed in claim 9, wherein said cap layer is a silicon nitrogen-oxide layer capable of being transmitted by ultra-violet light.

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REMARKS

This Amendment is filed in response to the Office Action dated February 13, 2002, which has a shortened statutory period set to expire May 13, 2002.

Claims 1 and 9 are rejected under 35 U.S.C. §112 due to several typographical errors and unclear statements. In order to correct these typographical errors and increase clarity to the claims, appropriate amendments have been made to claims 1, 6, 9 and 17 to address the informalities noted by the Examiner. The Applicant respectfully submits that no new matter has been entered in virtue of the amendments, and the support for the amended claims is present in the original claims.

The claimed invention is directed to a planarization method for inter-layer dielectrics (ILD) and inter-metal dielectrics (IMD). As is well known in the prior art, an ILD layer or IMD layer in a semiconductor device is generally coated with a cap layer of a high refractive index that serves as a passivation layer to inhibit moisture or hydrogen atoms from diffusion. Nonetheless, the conventional cap layer adapted to be used in a semiconductor device can not provide an efficient solution to separate ILD layer or IMD layer from moisture or hydrogen atoms, and further will cause negative effect on the later exposure step. The claimed invention is characterized by that a cap layer comprised of a refractive index not less than 1.6 is coated onto an ILD layer or IMD layer. With the introduction of the formation step of a cap layer of a high refractive not less than 1.6 after

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the ILD layer or IMD layer into the semiconductor manufacturing process, the capability of separating ILD layer or IMD layer from moisture or hydrogen atoms by the cap layer is reinforced. Further, because the refractive index of the cap layer according to the claimed invention approximates to that of photoresist, the accuracy of pattern transfer taken place in later exposure step will be substantially improved.

In view of the foregoing amendments and the following remarks, reconsideration and removal of the grounds of rejections of the claimed invention are respectfully requested.

Prior Art Rejections Of Claims 1-19 Under 35 USC 103

Claims 1-19 are rejected under 35 U.S.C. §103 as being anticipated by Andideh (USP 6,191,050) in view of Ang et al. (USP 6,232,217).

The Examiner deems that the planarization method for ILD layer and IMD layer in accordance with the claimed invention is obvious to one of ordinary skill in the art to combine the teachings of Andideh and Ang. As per the Examiner statements, Andideh discloses a process for manufacturing an inter-layer dielectric layer on a semiconductor device, including the steps of forming a dielectric layer comprised of inter-layer dielectric layer on a semiconductor substrate, applying chemical mechanical polishing to the inter-layer dielectric layer and coating a cap layer on the inter-layer dielectric layer. Also, Ang

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et al. suggests forming a capping layer comprised of silicon nitride, silicon oxynitride or silicon-rich oxide of a refractive index not less than 1.6.

In contrast thereto, it is appreciated the use of a cap layer of a refractive index not less than 1.6 does not suggested by these cited references. It can be clearly understood that in Ang patent, the refractive index of the capping layer does not explicitly specified. It can be seen from Ang that the selection of the refractive index of the capping layer are not referred herein. However, It is well known by a person skilled in the art that the refractive index of the cap layer comprised of silicon-rich oxide in a semiconductor device is typical around 1.5. It is to be emphasized that Ang does not teach the step of forming a cap layer of a refractive index not less than 1.6, while the claimed invention indeed teach the step of forming a cap layer of a refractive index not less than 1.6.

As stated above, it is obvious that Ang lacks the suggestion in connection with the refractive index of the cap layer formed above the planarized inter-layer dielectrics layer. Even if Andideh is combinable with Ang, it is intelligible that the feature of the claimed invention is no way of being obvious to a person having ordinary skill in the art in view of the combination of Andideh as well as Ang. The Applicant respectfully calls the Examiner attention that a person will not easily think of the use of cap layer having a refractive index not less than 1.6, and the present invention is neither anticipatable nor achievable over these cited references in these regards.

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Therefore, it is known that the claimed features of the Claims 1 and 9 of the claimed invention are significant. In order to highlight the feature of the claimed invention and peculiarize the difference of the field emission device manufacturing process among these cited references and the claimed invention, appropriate amendments have been made to the Claims 1, 6, 9 and 17. It is believed the rejections have been obviated by the amendments made herein. The Applicant respectfully submits that the claimed invention is patentable over these cited references either alone or in combination, and reconsideration and allowance of the claimed application are earnestly solicited at an early date.

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CONCLUSION

Claims 1-19 are pending in the present Application. Reconsideration and allowance of these claims is respectfully requested. Included herein is a marked-up version of the Claims showing the amendments made thereto. If there are any questions, please telephone the undersigned attorney at (410) 465-6678 to expedite prosecution of this case.

This Amendment was prepared by Applicant and is being filed on Applicant's behalf by the undersigned attorney.

Respectfully submitted,



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